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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the collection system of the char produced in the animal-waste-treatment device and carbonization treatment which dry livestock-droppings urine and are carbonized.

[0002]

[Description of the Prior Art]Organic wastes, such as livestock-droppings urine, are anxious about the processing from points, such as being accompanied by a bad smell, including moisture mostly. Once, although it may have been used effectively as a compost, since a domestic compost is a surplus now, there is a limit in processing as a compost.

[0003]

[Problem(s) to be Solved by the Invention]Then, the equipment and the method of carrying out carbonization treatment of the organic wastes, such as livestock-droppings urine, and using for fuel etc. from a viewpoint of effective use of resources, can be considered. However, since organic wastes, such as livestock-droppings urine, are scattered in the area, including moisture mostly, their efficiency of the recovery and transportation is bad, and they have a problem from a point of cost.

[0004]For example, if disposal equipment is introduced for every individual dairy farmer, in order to provide the both sides of a dryer and carbonization equipment, there is a problem of an installing space. There is also a problem that a fuel cost required for the desiccation and the carbonization of livestock-droppings urine containing many moisture becomes great. The operation management of equipment also has a problem.

[0005]The technical problem of this invention is in planning convenience of processing units, such as livestock-droppings urine, and reducing a cleanup cost.

[0006]

[Means for Solving the Problem] In order to solve an aforementioned problem, an animal-waste-treatment device of this invention, By carrying out a pyrolysis, it has a hot blast stove which formed a burner which burns desiccation and gas and a thermal decomposition reaction machine which generates a char, and auxiliary fuel in livestock-droppings urine, and gas generated from said thermal decomposition reaction machine is introduced into said hot blast stove, and is burned, and the combustion gas is supplied as a heat source of said thermal decomposition reaction machine.

[0007] That is, since desiccation and carbonization of livestock-droppings urine are unified and processed with a thermal decomposition reaction machine, a device can be made compact, individual installation is attained and convenience improves. Since combustible gas contained in production gas in a hot blast stove is burned and the combustion gas is made into a heat source of a thermal decomposition reaction machine, reduction of the amounts of assistant **, such as a fossil fuel, can be aimed at, and reduction of a cleanup cost can be aimed at. Since there are also few water vapor contents in gas produced in a pyrolysis when livestock-droppings urine etc. are a low-water-flow daily dose, auxiliary fuel, such as a fossil fuel in a hot blast stove, can be reduced more. Since it can also be considered as a heat source of a thermal decomposition reaction machine with a combustion gas of only combustible gas contained in gas, a cleanup cost can be reduced further.

[0008] When livestock-droppings urine etc. are a flood daily dose, it is preferred to supply a part of char to generate as an amount of assistant **. Auxiliary fuel, such as a fossil fuel, can be made into reduction or needlessness also in this case. If it mixes in livestock-droppings urine etc. and saw dust is beforehand fed into a thermal decomposition reaction machine, auxiliary fuel, such as a fossil fuel, can be similarly made into reduction or needlessness.

[0009] As for this invention, a char collection system of this invention is characterized by that a computer which can communicate comprises the following via a communication line with which a monitoring center was equipped.

A function for this computer to acquire measurement information of a storage of a char by which carbonization generation is carried out via said communication line with said animal-waste-treatment device, and to store this measurement information in a database.

A function which outputs recovery instructions of a char to a shipping agent's terminal via a communication line based on a storage of said char.

[0010] Thus, since recovery arrangements can be carried out at a carrier according to a storage if a storage of a char by which carbonization generation is carried out is supervised via a communication line, reduction of recovery cost can be aimed at and it becomes reduction of a cleanup cost. Since surveillance of a storage can be entrusted outside, and a check of a char storage in self and recovery arrangements become unnecessary, a user's of an animal-waste-

treatment device convenience improves.

[0011]It is preferred to acquire measurement information of a storage of a char of plant which generates a char as fuel via a communication line, and to output a supply command of a char to a shipping agent's terminal via a communication line based on a storage of a char. If a char storage of plant which uses a char as fuel is also supervised, a generated char can be efficiently supplied as fuel and commercialization of a char can be attained.

[0012]Also acquire operation abnormality information of an animal-waste-treatment device via a communication line, and display the operation abnormality information on a display, and. Since arrangements of repair can be performed without troubling a user of an animal-waste-treatment device even if abnormalities, such as failure, arise if instructions of check repair are outputted to a repair shop's terminal, convenience improves.

[0013]

[Embodiment of the Invention]Hereafter, the embodiment of this invention is described using drawing 2 from drawing 1. Drawing 1 is a conceptual lineblock diagram of the animal-waste-treatment device of this embodiment. Drawing 2 is a conceptual lineblock diagram of one embodiment of a char collection system.

[0014]As shown in drawing 1, the animal-waste-treatment device 1 of this embodiment, It has the hopper 9 grade which stores the hot blast stove 7 which burns the gas which generates livestock-droppings urine from desiccation, the thermal decomposition reaction machine 3 which carries out a pyrolysis, the hopper 5 which sends livestock-droppings urine to the thermal decomposition reaction machine 3, and the thermal decomposition reaction machine 3, and sends the exhaust gas to the thermal decomposition reaction machine 3, and the char generated from the thermal decomposition reaction machine 3. As for the char stored by the hopper 9, the part is used for the fuel for a hot blast stove if needed, and others are taken out outside and used for the fuel of plant, etc.

[0015]Next, the feature section of the animal-waste-treatment device 1 of this embodiment is explained in detail. The thermal decomposition reaction machine 3 is the horizontal-type revolving drum structure which made both distance of desiccation and a pyrolysis one, and has dual structure of the outer case 11 and the container liner 13 which were provided in the same axle. The both ends of the container liner 13 have projected the both ends of the outer case 11 from the both ends where it is closed and the outer case was closed. The screw feeder which is not illustrated is provided with the rotary drive, the bearing, and the sealing machine style, and the inside of the container liner 13 dries the livestock-droppings urine thrown into the one end side of the container liner 13 from the hopper 5, and it conveys it to the treater 15 linked to the other end side of a container liner, carrying out a pyrolysis. The combustion gas from the hot blast stove 7 carries out conduction to the space formed between the inner surface of the outer case 11, and the outside surface of the container liner 13 towards the hopper 5 side from

the treater 15 side as a heat carrier.

[0016]The drum section is open for free passage with the other end of the container liner 13 of the thermal decomposition reaction machine 3, and the treater 15 separates the gas and the char which are generated with the container liner 13 from desiccation and the livestock-droppings urine by which the pyrolysis was carried out. The upper part of the treater 15 is open for free passage to the hot blast stove 7, production gas is sent to the hot blast stove 7, and the lower part of the treater 15 is open for free passage in the hopper 9, and sends a generation char to the hopper 9.

[0017]The hot blast stove 7 burns in the production gas led from the treater 15, i.e., the combustible gas contained in desiccation and the gas which a pyrolysis is carried out and is produced with the thermal decomposition reaction machine 3, and supplies the combustion gas as a heat source of the thermal decomposition reaction machine 3. The hot blast stove 7 passes the pipeline 19 which is open for free passage with the treater 15 via the pipeline 17 with which production gas is led, and sends a combustion gas to the thermal decomposition reaction machine 3, and is open for free passage with the side by the side of the treater 15 of the outer case 11 of the thermal decomposition reaction machine 3. The pipeline 21 which leads the air for combustion to the hot blast stove 7 is formed via the hopper 9 and the air preheater. The air which carries out conduction of the inside of the pipeline 21 is taken in from the outside by the induced draft fan etc. which are not illustrated, is preheated with the hopper 9, and heat exchange of it is carried out to the combustion gas further used as a heat carrier from the thermal decomposition reaction machine 3 for the air preheater 23, and it is preheated. The apparatus 25 by which the pipeline 21 mixes the char as auxiliary fuel of the hot blast stove 7 between the hot blast stove 7 and the air preheater 23 is formed. Since it becomes insufficient burning a char of the combustible gas contained in gas when it is not always supplied and production gas contains a steam so much, a char is supplied as auxiliary fuel. Namely, as a heat carrier of the thermal decomposition reaction machine 3, since about 800 °C is required for the combustion gas of the hot blast stove 7, a part of generation char is supplied to this temperature at the hot blast stove 7 at the imperfect time.

[0018]The combustion gas of the hot blast stove 7 which is a heat carrier of the thermal decomposition reaction machine 3 comes out of the thermal decomposition reaction machine 3 from the pipeline 27 by the induced draft fan 29, after carrying out conduction of the thermal decomposition reaction machine 3, a part is sent to heating of the hot blast stove 7, and others send and carry out heat exchange to the air preheater 23, and are discharged outside.

[0019]The hopper 9 is provided with the load cell 31 which measures the quantity of the char which stores temporarily the char which was generated by the thermal decomposition reaction machine 3 and separated with the processing unit 15, and stored it. The measured value measured by the load cell 31 was read into the control device which is not illustrated, and has

transmitted to the external monitoring center etc. via a communications network with the communication apparatus.

[0020]P in a figure showed the pressure detection device, and T shows the temperature sensing device, was read into the control device illustrating neither, and has transmitted to the external monitoring center etc. via a communications network with the communication apparatus. The operation display of the rotary drive of the screw feeder which is not illustrated has transmitted to the external monitoring center etc. via a communication line similarly.

[0021]Thus, since desiccation and carbonization of livestock-droppings urine are processed in one with the thermal decomposition reaction machine 3, a device becomes compact and it becomes easy to carry out individual installation at a dairy farmer etc. Since the combustible gas contained in the gas generated with the thermal decomposition furnace 7 is burned with the hot blast stove 7 and the combustion gas is used as a heat carrier which is a heat source of the thermal decomposition furnace 3, use of auxiliary fuel, such as a fossil fuel, can be reduced. Since there are also few water vapor contents in production gas when livestock-droppings urine is a low-water-flow daily dose, use of auxiliary fuel, such as a fossil fuel, can be reduced more. Also when auxiliary fuel is required, reduction of a cleanup cost can be aimed at by replacing with a fossil fuel and using a part of generation char as auxiliary fuel. After mixing saw dust in livestock-droppings urine instead of a char, it may supply to a thermal decomposition reaction machine. At the time of 60% or less, auxiliary fuel can be needed when the moisture content contained in livestock-droppings urine exceeds 60%, it is exhaust gas of only combustion of the combustible gas in production gas, and it can dry and can carbonize. The generation char stored by the hopper is taken out outside and can be used by carrying out fuel of plant, etc. And farmland reduction of the char burned ash can be carried out as compound fertilizer substitution. Since the gas which dried livestock-droppings urine, carbonized and was generated is burned with a hot blast stove, the ingredient of a bad smell can be decomposed and it suppresses emitting a bad smell out of a system.

[0022]Next, a 2nd embodiment of this invention is described with reference to drawing 1 and drawing 2. A 2nd embodiment is related with the system which collects the chars generated with the animal-waste-treatment device of a 1st embodiment. Drawing 2 is a conceptual lineblock diagram of a char collection system. The char collection system of this embodiment receives the measured value of the char storage of the plant 53 which uses as fuel the storage of the char stored by the animal-waste-treatment device 1 shown by a 1st embodiment via the communications networks 51, such as the Internet, and a char, The monitoring center 55 orders a shipping agent's terminal A77 recovery and supply of a char. The measurement value the monitoring center 55 indicates the operation condition of the animal-waste-treatment device 1 to be, For example, measurement values, such as temperature of the thermal decomposition reaction machine 3 or the hot blast stove 7 and a pressure, the operation

display of the rotary drive of a screw feeder, etc. are acquired via the communication line 51, and a check repair shop's terminal B79 is ordered check repair according to the alarm etc. which are operation abnormality information further.

[0023]The monitoring center 55 is provided with the following.

The communication apparatus 57 which receives the measured value of a char, the measurement value of the animal-waste-treatment device 1, an alarm, etc. via the communication line 51.

The display 59 which displays measured value, a measurement value, an alarm, etc. which the communication apparatus received, and the memory storage 60 which is the databases which store these data.

The control device 61 which is a computer which controls these devices.

Although the animal-waste-treatment device 1 is three sets, A, B, and C, in this embodiment, it is for this giving explanation of this embodiment intelligible, and should just have one or more sets of the number. The animal-waste-treatment device A, B, and C is equipped with the metering installations 63a, 63b, and 63c, the metering devices 65a, 65b, and 65c, the control devices 67a, 67b, and 67c, and the communication apparatus 69a, 69b, and 69c, respectively. The load cell 31 which is a device which measures the storage of the char in the hopper which stores the char by which the metering installations 63a, 63b, and 63c were generated with the animal-waste-treatment device 1 in drawing 1 is used. However, the metering installation of the storage of a char is not limited to a load cell. By instructions of control device 67 grade, the measured value of a storage is transmitted to the communications network 51 by communication apparatus 69 grade. It has the metering installation 71, the control device 73, and the communication apparatus 75 with which the plant 53 which can use a char as fuel measures the storage of the char in the plant 53. A metering installation is a device which measures the storage of the char in the plant 67, and a load cell etc. are used, for example. The measured value of a storage is transmitted to the communications network 51 by instructions of the control device 73 with the communication apparatus 75 like an animal-waste-treatment device. The terminal A77 and B79 receive the instructions from a monitoring center via the communications networks 51, such as the Internet, and also. The information about business can be transmitted to the monitoring center 55 from the terminal A77 and B79, uniquely, the terminal A77 can receive the measured value of a char, and the terminal B can receive now the measurement value of each animal-waste-treatment device, an alarm, etc. from the communications network 51.

[0024]Operation of the char collection system constituted in this way is explained referring to drawing 2. Although the following explanation explains the animal-waste-treatment device A as an example, the same may be said of B and C. The communication apparatus 57 sends measuring instructions of the control device 61 of the monitoring center 55 to the

communication apparatus 69a of the animal-waste-treatment device A via the communications network 51. The measuring instructions received with the communication apparatus 69a are read into the control device 67a, and the control device 67a operates the metering installation 63a, and reads measured value. And the control device 67a sends metric data to the monitoring instrument center 55 via the communications network 51 from the communication apparatus 69a. The metric data received with the communication apparatus 57 of the monitoring center 55 is read into the control device 61, and is displayed on the display 59, i.e., a display etc. The char storage of plant is similarly displayed on the display etc. which are the displays 59 of the monitoring center 55 via the communications network 51. The control device 61 of the monitoring center 55 compares the recovery preset value of the storage which is the data in which the memory storage 60 was stored with the metric data which is the received measurement information. When the measured value shown in the metric data of the char storage of the animal-waste-treatment device A exceeds a recovery preset value, the control device 61 outputs char recovery instructions to a shipping agent's terminal A77 via the communication line 51 from the communication apparatus 57. It carries out similarly about the animal-waste-treatment devices B and C. When the char storage of plant is less than a supply preset value, the control device 61 takes out a char supply command to the terminal A77. [0025]The communication apparatus 57 sends measurement instructions of the control device 61 of the monitoring center 55 to the communication apparatus 69a of the animal-waste-treatment device A via the communications network 51. The measurement instructions received with the communication apparatus 69a are read into the control device 67a, and the control device 67a reads the measurement value of the total side device 65a. The metering device 65a is provided with the temperature sensing device in the space through which the heat carrier between the outer case 11 and the container liner 13 flows, and the hot blast stove 7, a pressure detection device, etc. in the container liner 13 of the thermal decomposition reaction machine 3, as shown in drawing 1. It also has the actuation detector of the screw feeder which is not illustrated. And the control device 67a sends measurement data to the monitoring center 55 via the communications network 51 from the communication apparatus 69a. The metric data received with the communication apparatus 57 of the monitoring center 55 is read into the control device 61, and is displayed on the display 59, i.e., a display etc., and is stored in the memory storage 60. The control device 67a of the animal-waste-treatment device A transmits an alarm to the monitoring center 55 through the communication line 51 with the communication apparatus 69a at the time of abnormalities, like apart from instructions of a monitoring center, the measurement value of the metering device 65a is out of the range set up as normal operation. The control device of the monitoring center 55 will output instructions of check repair to a check repair shop's terminal B79 via a communication line from the communication apparatus 57, if an alarm is received. When ordering it this check

repair, the control device 61 transmits the data about repair of the data about the animal-waste-treatment device A stored in the memory storage 60, for example, a device, etc., etc. if needed. It carries out similarly about the animal-waste-treatment devices B and C.

[0026] Thus, since the storage of a generation char can be supervised via a communications network, if a surveillance request is carried out in the monitoring center etc. which were provided outside, since it becomes unnecessary for the user of an animal-waste-treatment device to check the quantity of the char in a hopper and he is further released also from the troublesomeness of recovery arrangements, his convenience will improve. The plant can save the time and effort which checks the storage which is an inventory of a char self. Since the storage of the char of the both sides of an animal-waste-treatment device and plant is measured, the efficiency of char recovery rises. In this embodiment, although the animal-waste-treatment device was explained using three sets, A, B, and C, it is not limited to three sets and there should just be at least one or more sets. In order to carry out farmland reduction by considering char burned ash of plant as compound fertilizer substitution, if char burned ash is collected, transport efficiency of return which carried the char to plant will improve more.

[0027] Since the temperature of the thermal decomposition reaction machine of an animal-waste-treatment device or a hot blast stove and the detection value of a pressure can be supervised via a communications network, if the monitoring center provided outside is equipped with the monitoring instrument of this embodiment, package concentration is carried out and it supervises, the user of an animal-waste-treatment device will not trouble to check etc. At the time of abnormalities, such as failure, the user of an animal-waste-treatment device will trouble also to neither repair nor repair arrangements, and his convenience improves.

[0028] If the terminals A and B are possessed as a terminal of a portable type also while a shipping agent and a check repair shop move, recovery and supply of a char, and check repair will become quicker.

[0029] A monitoring center may monitor the char storage of an animal-waste-treatment device and plant continuously, and may supervise it for every fixed time. Measurement of the operation condition of an animal-waste-treatment device, i.e., temperature, a pressure, and an operation display may be monitored continuously similarly, and it may supervise for every fixed time. However, when measurement values, such as temperature and a pressure, exceed the range of normal operation, it is preferred to transmit to a monitoring center as an abnormality alarm from an animal-waste-treatment device irrespective of the existence of the surveillance of a monitoring center.

[0030]

[Effect of the Invention] According to this invention, the convenience of processing units, such as livestock-droppings urine, can be improved, and a cleanup cost can be reduced.

[Translation done.]